COV

RESEARCH › RESEARCH SUMMARIES

Sharing our progress toward recovery

Research Summaries

Discover what the latest science from the RECOVER Initiative means for our ability to understand, diagnose, prevent, and treat **Long COVID**.

This page contains descriptions of findings from **RECOVER research studies**. These descriptions use plain language and a format that is easy to understand.

If you want to learn more about the scientific discoveries described here, you can also browse and search the complete list of **RECOVER Publications**.

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● EHR ■ PEDIATRIC ◆ RISK FACTORS

Learning competing risks across multiple hospitals: One-shot distributed algorithms

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Doctors keep patient information in computer files called electronic health records (EHRs). RECOVER researchers can use these records to learn more about Long COVID, which is when someone feels sick for a long time after having COVID-19. But studying these records is not easy. It can be hard to get certain information from EHRs, when things that might explain why some people get Long COVID happen at different times. It can also be hard to put information from many hospitals together in one place and can cost a lot of money. In this study, RECOVER researchers made a new tool called ODACoR, which stands for "one-shot distributed algorithms for competing risks model." This tool was used to look at the EHRs of 6.5 million kids and teens from 8 children's hospitals. Researchers found that ODACoR was able to find information about things that could make children and teens more likely to get Long COVID. ODACoR could also combine information from different hospitals, which did not always work with old ways of studying health information. This tool gave the same results as if all the hospitals had shared all their information in one place, which is hard to do. This study is important because it can help doctors study other kinds of health problems using information from many hospitals.

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REVIEW PEDIATRIC NEW-ONSET AND PRE-EXISTING CONDITIONS RISK FACTORS VIRAL VARIANTS

Postacute sequelae of SARS-CoV-2 in children

Rao, S; Gross, RS; Mohandas, S; et al., *Pediatrics*

This paper talks about Long COVID in children. Long COVID is when a person still feels sick for at least 3 months after having COVID-19. This paper looks at how common it is, who gets it, what causes it, and what

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that up to 5.8 million children in the US might have Long COVID. The researchers talked about their plan for better understanding Long COVID by using RECOVER's definition of Long COVID and what RECOVER has learned so far. Authors of this paper share that future research on Long COVID in children should do the following: 1) describe Long COVID symptoms and how they show up together in groups, 2) understand why some children get Long COVID and others don't, 3) learn how symptoms come back when children get stressed or get COVID again, 4) find ways to stop hidden health problems from turning into long-term issues in adulthood, and 5) see if COVID vaccines can stop Long COVID from showing up. The authors of this paper also believe that more research should be done to find good treatments, test different medicines, and compare different ways to help children with Long COVID.

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● OBSERVATIONAL ■ PEDIATRIC ◆ VACCINATION

Real-world effectiveness of BNT162b2 against infection and severe diseases in children and adolescents

Wu, Q; Tong, J; Zhang, B; et al., *Annals of Internal Medicine*

This RECOVER study looks at how well and how long a COVID-19 vaccine, BNT162b2, works in children and teens. Researchers studied this before and during the wave of a new type of COVID, called Omicron. Researchers looked at the electronic health records from a group of children's health systems across the country, known as PEDSnet. They checked 3 groups: teens ages 12–20 during the earlier Delta wave; and both children ages 5–11 and teens ages 12-20 during the Omicron wave. Researchers looked at data from more than 77,000 teenagers during Delta and over 167,000 kids and teens during Omicron. Some of these kids were vaccinated, and

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teenagers (98%) from getting sick. In the Omicron wave, the vaccine helped stop 74% of the kids and 86% of the teenagers from getting COVID. It also helped keep kids from getting really sick and needing to go to the hospital. Children and teens who got vaccinated were also less likely to have heart problems during Omicron. But they found that the vaccines didn't work as well 4 months after the first dose. This information helps doctors better understand how to keep kids healthy when COVID is going around.

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EHR ADULT PEDIATRIC BROAD SYMPTOMS

Association between SARS-CoV-2 infection and select symptoms and conditions 31 to 150 days after testing among children and adults

Zhang, Y; Romieu-Hernandez, A; Boehmer, TK; et al., *BMC Infectious Diseases*

This RECOVER study looked at why some people may have long lasting symptoms or new health problems after getting COVID-19. Researchers looked at the electronic health records of 3.7 million adults and children who were tested for COVID between March 2020 and May 2021. They compared the records of people who tested positive for COVID with people who did not.

The study found that both adults and children who were hospitalized with COVID were more likely to have at least 1 symptom in the months after getting COVID, like shortness of breath. They also found that adults who were hospitalized with COVID were more likely to have 3 or more symptoms, feel very tired, or develop a new health condition. Some of the conditions were diabetes, blood disorders, or diseases related to

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COVID can impact people's health for a long time, even after their first infection is gone. These findings can help doctors and scientists better understand how to treat and care for people recovering from COVID.

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REVIEW ADULT PEDIATRIC

Long-term effects of COVID-19 on the cardiopulmonary system in adults and children: Current status and questions to be resolved by the NIH RECOVER Initiative

RECOVER Cardiopulmonary Committee; Rischard, F; Altman, N; et. al., *CHEST*

Long COVID may occur in people recovering from a COVID-19 infection and often includes symptoms related to the heart and lungs, which together are called the cardiopulmonary system. These symptoms, which include fatigue, shortness of breath, chest pain, cough, and reduced ability to do physical activity, can cause significant disability. This paper explores current knowledge about what causes Long COVID and how it affects the heart and lungs, in both adults and children. The authors also discuss how participants in the Researching COVID to Enhance RECOVERY (RECOVER) Initiative will help answer questions about the impact of Long COVID on the cardiopulmonary system. Understanding these causes and effects may help researchers discover new therapies for Long COVID symptoms.

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Vaccine effectiveness against Long COVID in children

Razzaghi, H; Forrest, CB; Hirabayashi, K; et. al., *Pediatrics*

Research shows that the COVID-19 vaccine lowers the chance of children getting sick from COVID. But it is not clear whether the COVID vaccine protects against Long COVID. RECOVER researchers did a study to look at how well vaccines work in protecting children, ages 5–17, against Long COVID. They studied data from a group of more than 1 million children. The vaccine was 42% effective in lowering the chance of getting Long COVID in kids ages 5–11 and 50% effective for kids ages 12–17. The vaccine works best against Long COVID within the first 6 months of getting it. After 6 months, it does not work as well, so getting the vaccine every year is important to prevent Long COVID. These results show that the COVID vaccine can help children 5 years and older to keep from getting very sick. While this study helps scientists understand how vaccines can protect against COVID, they still need to do more research to understand how they protect against Long COVID.

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● TISSUE PATHOLOGY ■ ADULT

Researching COVID to enhance recovery (RECOVER) tissue pathology study protocol: Rationale, objectives, and design

Troxel, AB; Bind, MC; Flotte, TJ; et. al.; RECOVER Initiative Autopsy Group, *PLOS ONE*

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are using tissue samples from people who died after having COVID to answer questions about Long COVID. To do this, they are studying donated samples from deceased people across the US to understand how the body changes when someone has Long COVID; what makes some people more likely to develop Long COVID, such as where a person lives and their age, race, and sex; and what happens in the body of someone who had Long COVID. This paper is important because it can show other scientists how to do their own research on Long COVID in people who have died.

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● OBSERVATIONAL ■ PREGNANT ADULT

Researching COVID to enhance recovery (RECOVER) pregnancy study: Rationale, objectives and design

Metz, TD; Clifton, RG; Gallagher, R; et. al.; RECOVER Initiative, *PLOS ONE*

A COVID-19 infection can lead to new symptoms, or symptoms that do not go away. This condition is called Long COVID. RECOVER researchers are working to answer questions about Long COVID in pregnant people. To do this, they are studying 2,300 pregnant people and their babies in the US to understand how often pregnant people get Long COVID; how the body changes when someone has Long COVID; what makes some people more likely to develop Long COVID, such as where a person lives and their age, race, and sex; and what happens in the body that might cause Long COVID. RECOVER researchers are also studying how COVID during pregnancy affects child development. This paper is important because it can show other scientists how to do their own research on Long COVID in pregnant people.

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EHR PEDIATRIC BROAD SYMPTOMS

NEW-ONSET AND PRE-EXISTING CONDITIONS

Spectrum of severity of multisystem inflammatory syndrome in children: An EHR-based cohort study from the RECOVER program

Rao, S; Jing, N; Liu, X; et al., *Scientific Reports*

RECOVER researchers studied how multisystem inflammatory syndrome (MIS-C) looks different in a large group of children. The researchers looked at electronic health record (EHR) data from 8 children's hospitals from March 2020 to September 2022. They studied 1,139 children who were patients hospitalized for MIS-C. The researchers divided the patients into 3 groups and used age, sex, location, symptoms, conditions, test results, and medications to look for patterns in these groups. Researchers then looked at how the groups were similar and how they changed over time. The study showed that MIS-C has a range of severity, from mild to medium and severe. This means that MIS-C symptoms can be different for each child. The researchers also found that there are fewer severe MIS-C cases now than there used to be. The study might not have included some children if they had symptoms like MIS-C but had a different illness, had Kawasaki disease when they were in the hospital (because of how similar the symptoms can be to MIS-C), or had mild MIS-C symptoms that did not bother them that much and may not have been written in their EHR. This study can help doctors better understand and treat MIS-C.

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